DOCUMENT RESUME

ED 414 899 IR 018 679

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TITLE The Development and Implementation of a User-Based Design Process in Web Site Design.
INSTITUTION Maryland Univ., College Park. Coll. of Library and Information Services.
REPORT NO CLIS-TR-97-04
PUB DATE 1997-12-00
NOTE 52p.; Research funded by Disclosure, Inc.
PUB TYPE Reports - Descriptive (141)
EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Access to Information; *Business Education; Evaluation Methods; *Focus Groups; Higher Education; Information Retrieval; *Information Seeking; Information Systems; Information Utilization; Online Systems; User Needs (Information); *Users (Information); *World Wide Web
IDENTIFIERS *Web Sites

ABSTRACT

This report describes the development of a World Wide Web site designed for business school faculty. During the project, the project team formulated and followed a user-based design process, which places the user centrally in all stages of the process: information-gathering, development, test and evaluation, and implementation. The technical report does not discuss in detail all activities involved in the development. Greater attention is given to describing and presenting the results of the data-gathering phase and to explaining the user-based design process both in general and as it was applied in this project. The information-gathering phase is based on a focus group session with faculty from four business schools in an electronic environment, using VisionQuest software, and on supplementary questionnaires. It emphasized identifying the criteria that business faculty consider in using a Web site but also placed these within the context of general information-related behavior. Appendices include human subjects research form, invitation to participate, e-mail questionnaire, description of VisionQuest software, e-mail evaluation of the focus group session, and chronology of the project. (Contains 31 references.) (Author/SWC)

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The Development and Implementation of a User-based Design Process in Web Site Design

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CLIS TECHNICAL REPORT NO. 97-04
December 1997

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Abstract

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Note: This research was funded by Disclosure, Inc., but all decisions were made by the researchers without influence from the funding agency. The order of the authors does not indicate primacy of authorship; all authors are equal participants in the research reported in this paper. The authors are grateful to the participants from the four business schools in the project and to Disclosure, Inc. Special thanks to the CLIS graduate students who participated in this project: Lois Chester, Lee Tuckman, and Elizabeth Spencer.

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Table of Contents

I. Introduction and Literature Review 1
Literature Review 1
Overall Project Methodology 4

II. Identification of User-based Design Criteria 6
Research Questions 6
Methodology 6
Participants 6
Questionnaire 7
Focus Group Session 7
Analysis 9
Criteria 9
General Information-Related Behavior 9
Web Use 14

III. The User-based Design Process and Its Application 16
Information-gathering Stage 17
Development Stage 18
Content 18
Structure 21
Use 22
Linkage 22
Search 22
Appearance 23
Evaluation Stage 25
Implementation Stage 26

IV. Conclusion 28

Notes 33
References 35

Appendices
A. University of Maryland Human Subjects Research Approval 39
B. Invitation to Participate 41
C. E-mail Questionnaire 43
D. Description of VisionQuest Software 45
E. E-mail Evaluation of the Focus Group Session 47
F. Chronology of the Project 49

List of Tables and Figures

Tables

I. Questions/Tasks Covered During the Focus Group Session Tables 8
II. Sample of Relationships Between Features and Clusters 10
III. Web Page Features Considered Most Influential in Decisions to Use 11
IV. Types of Business Information Used by Participants 12
V. Reactions to Web Availability of Business Information 15
VI. Operational Definitions of User Criteria 19
VII. Relationship Between Final and Original Categories 29

Figures

1. User-based Design Process 5
2. User-based Criteria and Their Relationships 20
3. Original Top Level Page 21
4. Evaluation Form 24
5. Suggestion Form 27
6. Final Top Level Page 30

Part I. Introduction and Literature Review

This report describes the development of a World Wide Web site designed for business school faculty. During the project, the project team formulated and followed a user-based design process. This process is described in greater detail in Part III. The technical report does not discuss in detail all activities involved in the development. Greater attention is given to describing and presenting the results of the data-gathering phase and to presenting the user-based design process both in general and as it was applied in this particular project.

Literature Review

The emergence of the World Wide Web has resulted in the creation of a wide range of new information resources. Perhaps because the Web presents a new medium for information provision, these resources vary widely in quality and utility. Both resource providers and resource users face the problem of determining the hallmarks of a well-designed, useful resource on the Web. Thus users and designers alike continue to struggle with the question of how to design pages effectively and how to evaluate existing Web-based resources. A number of potential approaches to evaluating Web resources have been suggested to date.

The earliest impulse seems to be developing somewhat ad hoc criteria largely based on the features offered by the Web and HTML architectures and the personal experiences of designers. The criteria offered vary widely in their usefulness and generalizability. A plethora of articles and books offer advice to would-be designers or evaluators. For instance, Falcigno and Green (1995) suggest that well-designed sites demonstrate a clear understanding of audience needs and preferences, appropriate use of hypertext links, reasonable page length, organization, balance between graphics and transmission speed, and currency of links. McClements and Becker (1996) suggest that links connecting all site pages to the site's home page, identifying graphics on each page, a short home page, links, limited use of graphic, short cuts, and user testing are desirable design elements. While this type of advice is helpful to designers, concrete measures of successful design are lacking.

The limitations of using design advice as a basis for the creation of design criteria for subsequent evaluation of Web sites is illustrated by Stover and Zink (1996) who analyzed 40 Web pages to determine page characteristics such as the number of links, number of images, length, image size, date of last modification, presence of statement of purpose, links to sponsoring organization, indication of authorship, and presence of a comment gathering mechanism on the home page. This list of criteria, which was drawn from the literature of advice to designers, was translated into a simple, unweighted point system for comparative evaluation of the sites. They interpreted the relatively low scores of the sites examined as reflecting general poor design of higher education Web pages.

However, the simplicity of their metric and the lack of any theoretical base for their selection of criteria makes interpretation of their results problematic. They offer no report of any attempt to validate their metric.

Another weakness of this type of approach to evaluation is that the developer community is consistently the source of this type of the information used. While the importance of knowing a site's audience and their needs is frequently emphasized, the views of actual users are not incorporated. It is not unlikely that developers' preferences differ in significant ways from those of users and that sites developers consider well-designed may be viewed in a very different light by users.

An alternative approach, championed by some in the library community, is to develop evaluation criteria using insights from the evaluation of print-based information resources. Pratt, Flannery, and Perkins (1996) advocate this type of approach and provide guidelines that include the usual categories of print evaluation criteria, such as content, comprehensiveness, uniqueness, authority, and cost, and then suggest additional criteria such as need for hardware or software, ease of use, search capabilities, and availability. Rettig (1996) also provides a detailed discussion of the relationship between evaluation criteria for paper resources and Web resources.

A third approach draws on research related to computer interface design. The interface design community has been quick to realize that much of the knowledge based developed for design of other types of information systems, and particularly other types of hypertext systems, may be relevant to the issues of Web site design. The subject has been discussed at several meetings (Instone, 1996; Shum, 1996). Nielsen and Sano (1994) report the results of a project to implement traditional interface design techniques into a Web site design. Shneiderman (1996) synthesizes the implications of interface design traditions to suggest principles for Web site design. Borges, Morales, and Rodriguez (1996) developed a set of guidelines heuristically and report on the results of usability testing based on the design criteria they identified. While this approach may seem superficially similar to that used by Stover and Zink (1996), the usability testing approach employed is widely accepted in the interface design community. Although the approach was more rigorous than many others, the testing was performed with a small number of subjects and their largely ambiguous findings must be viewed as preliminary.

An alternative approach to the development of design criteria has been largely unexplored. Web site developers and librarians have generated criteria based on their experiences and outlooks. Users are represented at best secondarily in these approaches to design criteria development. The importance of users in the development of computer systems has been recognized since the 1970s by software engineers, interface designers and information professionals; however, efforts made by these groups have not been coordinated nor does one group build on lessons learned from the others. For example, the results of studies of user needs and information seeking behavior conducted by

information professionals (See, for example, Hewins, 1989; Shaw, 1991) have not been linked to the work of software engineers and interface designers.

Software engineers have recently noted the need to enhance the identification and definition of user requirements by working more closely with researchers involved in human-computer interaction (Johnson and Jones, 1997). However, user requirements seem to be defined narrowly in terms of tasks. User involvement in the design of computer systems has been limited primarily to usability testing conducted during the evaluation stage, after a system has been designed. Thus, while it has been recognized that an understanding of user behavior is important to designing information systems, user behavior has been defined narrowly in terms of specific tasks using task analysis to analyze and describe a particular end-user task (Hartson and Hix, 1989). While tasks are important, user requirements based solely on tasks lack the scope necessary to develop a truly effective system.

One exception to this is a move toward participatory design, also referred to as cooperative design in parts of Scandinavia. Participatory design was introduced as a method of joint design of software products between the user as expert and the system designer. This approach goes beyond the user's role in testing an already designed system or prototype (Floyd *et al.*, 1989). The importance of considering user needs in the development of the Internet, both as a network and in individual Web sites, has been noted in the literature. On a broad level, Muller (1996) discusses the need to consider the multicultural constituencies using the Internet. Focusing on Web page design, Shneiderman (1996) notes that, as in any user interface design process, the initial question facing Web site designers relates to the identification of the users and the users' tasks. He indicates that Web pages should be targeted to specific user groups in much the same way that advertising is geared to certain groups. One Web site will not meet the needs of all potential users of that site, just as one print reference book will not meet the needs of all individuals interested in its subject. The idea of segmenting Web pages by user groups has not been adopted in many instances but would enhance the effectiveness of many Web pages.

There is little evidence that user needs have been incorporated into the most Web site design efforts. Few examples of collaborative or participatory Web page design have been found in the literature. One collaborative design described efforts between librarians, rather than end-users, and departmental Web designers (Andrew and Musser, 1997). Neilsen (1995) reports on a case study in which a Web page was designed incorporating usability testing. Shneiderman (1996) notes the lack of empirical and objective data to assist future designers. The case studies found are anecdotal and do not present a methodological and systematic approach

It may be that the overall lack of user input into design has developed because users as a group have relatively limited, idiosyncratic use of Web resources and that most

users have not had time to develop the level of use that would allow them to provide useful oversight of Web design issues. However, the Web is maturing rapidly and currently a body of users has developed possessing the necessary levels of use of Web sites and the breadth of exposure to allow the exploration of a user-based approach. User-based criteria would fill a gap in the range of approaches to criteria development and could provide a rich source of insight into an area that seems to be widely recognized as problematic.

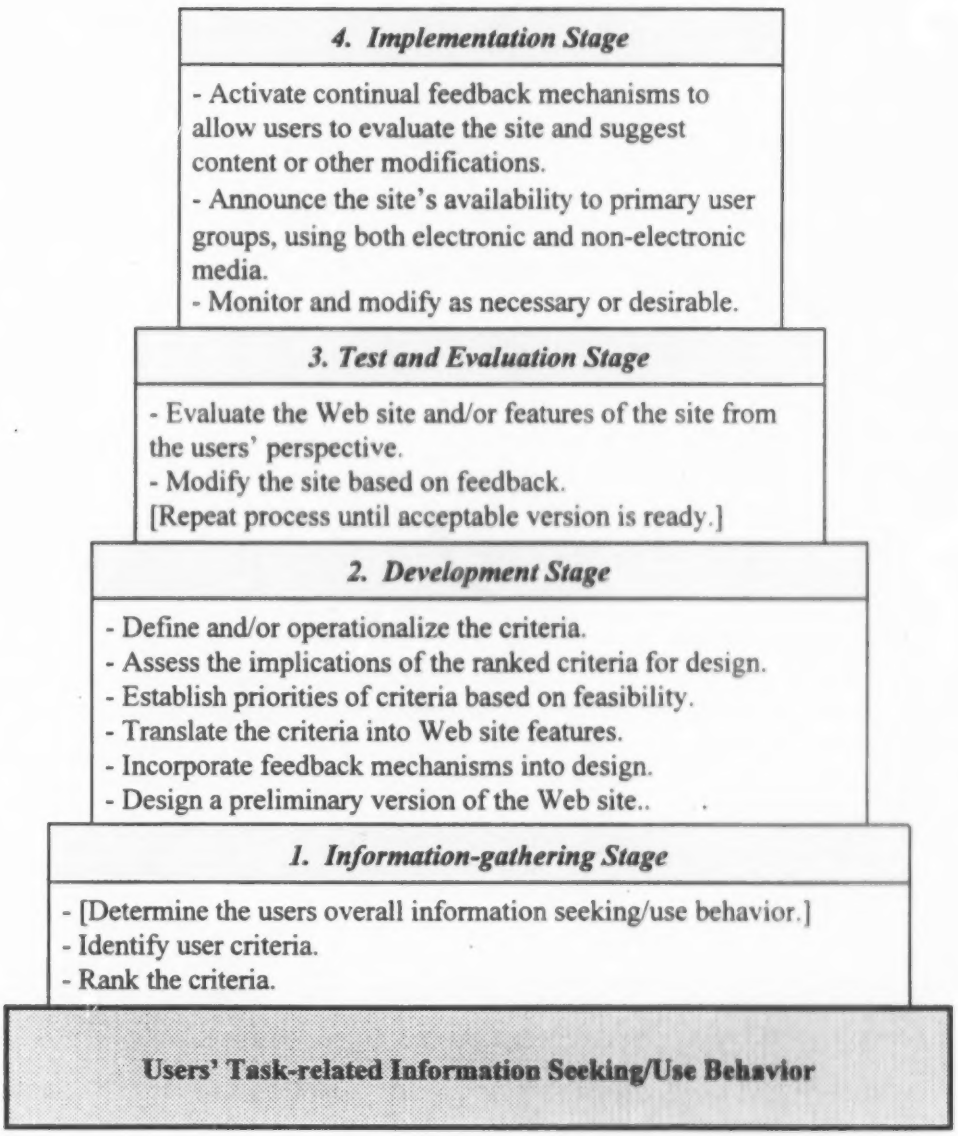
For this project, business school faculty members offer several advantages as a participants in the development of a user-centered approach to criteria development. As Diamond (1996) reports, business faculty use a wide range of information sources including both primary and secondary sources. They often seek information that is rapidly outdated and often difficult for libraries to acquire. They often use information that is consider valuable by information producers and has a wide audience beyond academe. There is evidence that a significant amount of business information is available online and has been for a while (Haas, 1994; Morgan and Kelly-Milburn, 1994; Turdor, 1996). Several projects to disseminate government information relating to securities have been highly publicized (Bates, 1996; Pagell, 1995). Thus business faculty could be expected to be motivated to seek out and use Web resources and have a significant base of expertise as Web users.

Corporations, government agencies, non-profit groups, and other organizations are recognizing the potential of the World Wide Web to disseminate information resources. The quality of these sources varies widely, since there is little consensus on good design and relatively little standardization. For a Web site to be successful amid the millions of sites available, it must satisfy the information needs of its intended audience and meet the user's criteria for repeated use.

Overall Project Methodology

In developing the Web site, the Project Team also developed and implemented a user-based design process. This process, shown in Figure 1, places the user at the center of the design process and emphasizes his participation throughout the initial design and development of the site and into its implementation and long-term development. It consists of four stages: Information-gathering; Development; Evaluation; and Implementation. Part III describes these stages and the sub-activities involved in each both generally and specifically in relation to this project. Part II describes in considerable detail efforts to gain information about user criteria for evaluating Web site use and the relationship between business school faculty's use of the World Wide Web and their other information-gathering behavior.

Figure 1. User-based Design Process


4. Implementation Stage
- Activate continual feedback mechanisms to allow users to evaluate the site and suggest content or other modifications.
- Announce the site's availability to primary user groups, using both electronic and non-electronic media.
- Monitor and modify as necessary or desirable.
3. Test and Evaluation Stage
- Evaluate the Web site and/or features of the site from the users' perspective.
- Modify the site based on feedback.
[Repeat process until acceptable version is ready.]
2. Development Stage
- Define and/or operationalize the criteria.
- Assess the implications of the ranked criteria for design.
- Establish priorities of criteria based on feasibility.
- Translate the criteria into Web site features.
- Incorporate feedback mechanisms into design.
- Design a preliminary version of the Web site..
1. Information-gathering Stage
- [Determine the users overall information seeking/use behavior.]
- Identify user criteria.
- Rank the criteria.
Users' Task-related Information Seeking/Use Behavior

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Part II. Identification of User-based Design Criteria

Research Questions

The research addresses several important questions. The first, and most important, focuses on identifying the criteria that users consider in using a Web site. The other three are designed to put these criteria in some perspective by characterizing the user community's information needs and search behavior generally and specifically their Internet and Web use.

1. What characteristics of Web sites affect use?
2. What kinds of information related to their work activities does the user community need?
3. How do they currently find this information, considering a wide range of sources, not just the Web?
4. How do they use the Internet and the World Wide Web currently and how is this behavior likely to change as more resources become generally available or available in a form useful for their purposes?

Methodology

For this exploratory research, the project gathered data from business faculty with Internet experience through a questionnaire distributed electronically and a half-day focus group session held in an electronic environment. Approval to conduct research involving human subjects was received. A copy of the approval form is included in Appendix A.

Participants. A total of 32 people were invited to participate in the focus group session in two stages through a modified snowball sampling approach. All contacts prior to the session, including the invitation, occurred via e-mail. The Invitation to Participants is included in Appendix B.

Initially a sample of 5 participants was selected from faculty members from each of four graduate business schools in the Baltimore/Washington metropolitan area (N=20). The Business Schools included were: University of Maryland, Georgetown University, George Washington University, University of Baltimore. The initial group was selectively chosen to represent both genders, a range of fields, and teaching experience in graduate and undergraduate courses. At the second stage, faculty members who could not participate were asked to suggest colleagues, and other faculty were selected to insure representation from each business school. An additional 12 were identified and forwarded invitations. Excluding those in the original sample with schedule conflicts, but including new invitees, the modified sample was 24. From this group, nine (38 percent of the modified sample) participated, four of whom had been suggested by their colleagues.

The nine participants represented the four different business programs. Three were women, six were men. All indicated that they taught at the master's level, which is not surprising considering the emphasis on the MBA degree in these programs; six indicated they taught also doctoral students; and four indicated they taught at the undergraduate level. The fields represented included accounting, finance, human resources management, marketing, and strategic planning. They all had doctoral degrees.

As a group the participants were long-term, frequent e-mail users with four or more years of almost daily usage. Their e-mail usage had paved the way for their Web use, which had begun more recently. For most, their Web experience had begun within the last one or two years, but they generally used it several times a week to several times a month; only one person indicated very infrequent use.

Questionnaire. A brief questionnaire sent to each participant prior to the focus group session provided background information on the participants' computer and World Wide Web use so that questions could be modified to reflect the range of experiences/expertise among the group. The response rate was 100 percent. The e-mail questionnaire is included in Appendix C.

Focus Group Session. The focus group session itself was held in the AT&T Teaching Theater at the University of Maryland, using the VisionQuest software. A description of the software is included in Appendix D. This software allows for a range of collaborative tasks, including brainwriting, commenting, grouping/sorting lists, and rating items on a list. In this session, two researchers knowledgeable about both business information and Web capabilities moderated discussions between the computer tasks, and a computer facilitator skilled in the use of the software occasionally asked for clarification of terms/ideas. The aggregated data were available in electronic form immediately after the session for the researchers. In general, the statistics provided by the software package are not very sophisticated but are appropriate for a focus group session.

The focus group session consisted of two subsessions. The first emphasized general business information gathering behavior, including the use of formal (print and electronic) and informal sources, *e.g.* personal contacts, which could have occurred via a range of media, including e-mail. The second elicited specific data related to use of the Web. Table I shows the questions and/or tasks covered in the individual subsessions.

During the session, each participant entered his data in the form of ideas, rankings, or ratings via a computer. Periodically he submitted the data to the server, which processed the data to provide aggregated findings to facilitate group discussion. No data were ever identified with an individual. Occasionally, when the data were used for a subsequent task, they were submitted to group scrutiny before that task to clarify ambiguities and remove duplicates.

Table I. Questions/Tasks Covered During the Focus Group Session

Question	SoftwareTask*
Session I. Use of Business Information	
What types of business information do you use in connection with your work as a professor?	Brainwriting
Please estimate the importance of each of these types for you personally.	Rating
For each type of business information, please list the sources you use to obtain the information.	Commenting
For each type of business information -- if it were on the Web now, would you use it?	Categorizing
For each type of business information -- if it were on the Web now, would you have your students use it?	Categorizing
Session II. Use of Web Information	
Consider the Web sites you have found most useful for business information. What features do you like about these sites?	Brainwriting
For each feature, please rate its influence on your use of a Web site.	Rating
What features have you disliked about Web sites that you have tried to use to obtain business information?	Brainwriting
For each feature, please rate the negative influence of the feature on your use of a Web site.	Rating
If business information were available from multiple sources, what would prompt you to choose the Web over other sources?	Brainwriting
How do you find out about useful Web resources?	Brainwriting
What factors limit your use of the Web for business information?	Brainwriting
Please rank the sources of information about Web sites in order of the frequency with which you use them.	Rating
What services or information would you be willing to pay for on the Internet? Consider personal, departmental, or grant payment.	Brainwriting
Please list names and/or descriptions of any Web sites you particularly like.	Brainwriting

* Refers to the specific software task in VisionQuest software.

Analysis

Criteria

Through "brainwriting," which is designed to stimulate and elicit ideas, the focus group identified 46 positive features and 43 negative features of Web sites. They subsequently rated these on a 5-point scale on their degree of influence on subsequent use or non-use of Web sites.[1] The features were screened to merge duplicates and to remove system-related features and ambiguous or vague features. The adjusted totals were 33 positive features and 18 negative features (72 percent and 42 percent of the original respective lists). The remaining site features were clustered based on similarity of interest, disregarding the positive or negative aspect of the criterion. Items relating to more than one cluster were duplicated in each cluster. Table II shows examples of coding for the relationship between an influential feature and its corresponding cluster.

The items were then ranked within the positive and negative groups according to the average ranking; the ranks for positive ranged from 3.1 to 4.9, for negative from 2.7 to 4.3. The median rank was used to determine the most influential factors (3.56 for positive factors; 3.44 for negative factors). Table III shows these factors. The positive features to the left promoted use; the negative factors on the right contributed strongly to discontinuing use. Six clusters emerged in the analysis: appearance, content, linkage, special feature, structure, use. The ranks for the items included in each cluster were combined and averaged. For positive factors, all clusters appeared in order: use (4.4); content (4.3); linkage (4.1); structure (4.1); special feature (3.7); appearance (3.6). It is apparent that the participants rated use and content above appearance. Structure and search capability would generally contribute to use. For negative factors, only four clusters appear. In order, they are: use (4.3); content (4.0); structure (3.7); and linkage (3.6).

In addition to Web page/site features, the focus group members reacted positively or negatively to factors extrinsic to the Web sites. Usually they were related to search system features or to Internet or World Wide Web features. Slow response times and system crashes, for example, were strong negative influences; the availability of search engines and the flexibility of access to the Internet, both in terms of time and location, were strong positive influences. In terms of search engines, they commented negatively, for example, about inefficient searches or misinterpretations of search query words and retrieval of extraneous information.

General Information-Related Behavior

The participants identified and ranked 49 different types of information they used in their work activities, which included teaching, research, and consulting. The participants ranked the importance of the types of information on a 5-point scale, with 1 as "not at all important" and 5 as "very important." Users had some difficulty in

Table II. Sample of Relationships Between Features and Clusters

Feature	Cluster
Influential Negative Features	
Slow response time	System
Waiting for links and connections	System
Search engines that take forever to give useful results	System
Systems crashes from poor software, system overloads	System
Getting lost	Navigation
Superficial information; not informative	Content
Sites that go nowhere say nothing	Content
Advertisements	Content
Wasted search time	Search
Inefficient search	Search
Search engines that do not really search or take forever to give useful results	Search
Influential Positive Features	
Usefulness of information	Content
Currency	Content
Linkage to relevant sites	Linkage, content
Ease of use	Use
Ease of navigation through a database	Use
Intelligible structure	Structure
Well-organized	Structure
Ability to get overview of structure	Structure, Use
Straightforward	Structure
Reasonable response time	System

Table III. Web Page Features Considered Most Influential in Decisions to Use

Positive Features	Negative Features
Use	
Ease of use	Navigation problems
Ease of navigation through a verbal database	
Ability to get overview of structure	
Content	
Usefulness of information	Superficial information
Currency of information	Uninformative content
Concise, non-repetitive information	Advertisements
Contains information not easily or readily found in library collections	Repetitious content
	Boring text
	Lack of currency of information
Structure	
Well-organized	Long text
Intelligible structure	Poorly named subsections
Ability to get overview of structure	
Straightforward	
Breaking up of text	
Innovative presentation and organization	
Linkage	
Linkage to sites with relevant information	Linkage that goes nowhere
Ability to switch back and forth between topics	
Special Feature	
Predictable address	
Search capability on single page	
Appearance	
Visually attractive	
Printable without overly-darkened areas	

Note: Broad categories are arranged according to ranked order, which was the same for both positive and negative factors.

differentiating between information and sources. Many of the items referred to specific sources or means of conveying information, not to types of information.

The large set was screened to remove duplicates, ambiguous items, curriculum or course-related items, such as student feedback, Web-related items, and items referring to specific sources, not types of information. Sometimes a highly specific particular source was translated into a type of information. Twenty-nine of the items remained (59 percent). The average rank for these items was 2.8 (S.D. .7), but ranged from 1.9 to 4.4. These items were clustered into broad categories, and the average rank of items in each cluster was computed to serve as a basis for ranking the broad categories.

Table IV shows the broad categories, according to their ranked importance: literature (3.9); case studies and other stories (3.0); government information (2.8); news related to business-related events (2.7); directory information (2.7); statistical or numerical data (2.4); and standards and procedures (2.1). The more specific types mentioned by the respondents provide the examples noted for each broad type.

Table IV. Types of Business Information Used by Participants

Literature Includes scholarly articles in business or professional journals.
Case Studies and Other Stories Includes formal case studies likely to be used in class assignments, anecdotal information about business decisions by major participants.
Government Information Includes government procedures, legislation, regulations.
News Related to Business-related Events Includes both current articles and news summaries appearing in the business or general news press.
Directory Information Includes current addresses, telephone numbers, lists of boards of directors.
Statistical or Numerical Data Includes historical, current, and forecast data about elements such as stock prices, balance sheet data, profitability statements.
Standards and Procedures Includes, for example, accounting principles from the official professional group or "best practices."

Note: Information types are presented in order of importance to focus group members.

The types of information and sources used to locate those types are subject or discipline specific and the relevant level is probably not "business" but subfields of business, such as "accounting," "finance," and so on. Generalizing about types of information or sources used to locate them, as noted in the next paragraphs, is therefore questionable with such a small sample. In part, these problems justify grouping specific items into broad categories or noting the information only as part of case studies. At the broad category level, the identification of types of information is probably more reliable than the rankings attributed to them by this focus group. Not surprisingly, the categories ranked highest are those which are applicable across a broad range of business fields. Not all fields relate to standards or statistical information.

The participants also indicated the sources they currently used to locate the most heavily ranked types of information. In general, they used a variety of interpersonal, print, video, and electronic sources, with multiple types of sources often used for each category. The following examples serve to illustrate their current, eclectic approaches to finding useful information.

- For both *professional and scholarly literature*, they mentioned specifically 12 magazines and newspapers, including, for example, the *Wall Street Journal*, the *Washington Post*, *Business Week*, *Fortune*, *Journal of Finance*, and *Wired*. Their references to the online versions of several of these titles indicates some acceptance already of full-text of journals or newspapers in electronic format. They searched two electronic databases to locate these articles: *ABI/Inform*, a broadly-based business literature database, and *PsychLit*, a comprehensive psychological literature database, which covers the psychological literature useful in human resource management or marketing research. Neither of these cover the newspapers. They also mentioned an Internet search engine and an online public access catalog.

- For *case studies*, which are widely used in classes, the participants relied on published case studies, such as those published by the Harvard Business School (HBS) and the Darden School of Business or included in commercially published casebooks. In addition, they consulted electronic sources, *e.g.* colleagues' Web sites; videos of company practices/issues; sometimes they wrote their own. Several participants commented favorably on being able to preview HBS case studies by downloading them from their Web site.

- For *war stories about experiences*, the participants drew on their own personal experiences, books and journals, discussions with trusted professionals, newspaper articles, conference events, and guest speakers.

- For *practical applications of business practices*, they used solely interpersonal sources, gleaned from interactions with professionals in the community and in

professional organizations, continuous networking with practitioners, and attendance at professional development meetings.

It is apparent in these brief case studies of locating useful information that the participants are already adapting information gathering patterns based on an pre-Internet/Web environment that drew heavily on personal contacts, both within their work setting and through conferences and connections with the business community, and printed sources, some identified through formal means such as checking indexes and some which were monitored as part of their current awareness efforts to read current issues of relevant journals and newspapers, to the new world of electronic access, both to colleagues and other personal contacts and to printed sources.

Web Use

How is behavior likely to change as the participants become more aware or knowledgeable about Web resources and as more business information relevant to their purposes becomes available? The basic categories listed in the first two columns in Table V are derived from business information the faculty indicated they were already using in connection with teaching, research, or consulting (Summarized in Table IV). Table V shows their reactions about use if the information were available on the Web.[2] The asterisked items in the second and third columns show the overlap with the broadest set of participant choices in the first column.

The only new option the participants would recommend to students they would not necessarily use themselves is foreign business journals; these schools have many foreign students in their programs. The participants generally would use more information types than they would be willing to pay for. For Column 3, the participants generated the types of information anew, specifically in terms of willingness to pay for them. Their responses reflect the current market status for most of these types of information, and there is some overlap with types already mentioned in Column 1, but there are some notable differences. In the first column, they anticipate getting company-related information by going to individual corporate reports or corporate Web sites and would probably be using this for individual company or small groups of companies analyses. Many companies have Web sites, and the faculty undoubtedly foresee provision of this information by publicly-held companies as a public service companies should provide free of charge. On the other hand, they would be willing to pay for a database which compiled certain kinds of data, *e.g.* stock prices, for many companies to allow them to do cross-company analyses easily. Two of the information types are somewhat novel -- the current subject-specific phone/address lists, and the "inside information" from prominent individuals. Presumably the prominent individuals would be people involved in business deals or noteworthy observers, but the kinds of individuals were not identified. The participants show, for example, a willingness to pay for expert opinion in the case of the market analysts' reports.

Table V. Reactions to Web Availability of Business Information

Willing to Use	Willing to Refer to Students	Willing to Pay For
Best practices	* Corporate annual reports, related information	* Current price and financial information for companies
Case studies	* Databases	* Databases
Corporate annual reports, related information	Foreign business magazines	* Electronic versions of journals
Databases	* Journal articles showing company practices, problems, issues	Inside knowledge of prominent people
Journal articles showing company practices, problems, issues	News summaries	Market analyst reports
New developments in information technology	* Practical applications of business practices by professionals	Topic-area lists of current, relevant addresses
Practical applications of business practices by professionals	* Professional journal articles	* *Wall Street Journal* or other business news sources
Professional journal articles	* Professional organization information, e.g. standards	
Professional organization information, e.g. standards	* Research journal articles	
Research journal articles	* War stories	
Wall Street Journal or other business news sources	* Course syllabi	
War stories		
Course syllabi		

Notes: The first and second columns list any information type mentioned by six or more participants. The third column lists all information types mentioned.
* Indicates categories duplicated in Column 1.

Factors which would prompt the participants to use business information on the Web rather than in other media or formats are:

- Cost,
- Convenience, both in terms of time and physical access ,
- Ability to get electronic or paper copies easily,
- Characteristics of information, such as the credibility of the source,
- Ability to rely on themselves rather than an intermediary,
- Response time,
- Environmental concerns, and
- Ease of use, which could refer to many of these factors in itself.

To find resources located on the Web, they relied in order on: Web-related features, especially search engines and links; colleagues, including students; print

sources; and formal training by librarians or other information professionals. For example, related to colleagues, they mentioned exchanging bookmarks and seeing descriptions of good sites on subject-related listservs. For print sources, they noted, for example, lists of Web sites in professional newsletters, URLs included in advertisements, newspaper and journal articles, and recent textbooks. One participant mentioned a specific guide to Internet resources for her field. In the vocal discussions, they expressed some misgivings about their abilities in finding information that could be of use to them and were interested in any tactics they might adopt to help them to locate relevant information.

For inhibiting factors to Web use, the respondents mentioned:

- Self-related problems, *e.g.* ignorance, inexperience, lack of time, tendency to use familiar sources, need to balance student's over-reliance on the Web, and competing demands,
- Web-related problems, *e.g.* site fragmentation, lack of filtering, more raw data than analysis, and
- System-related problems, *e.g.* inability to use anything but a text-based system from home, slow response time on the university's network, software lockups.

Two findings about inhibiting factors are notable: first, many of the self-related problems are cognitive or psychological; and second, price is not mentioned as a inhibiting factor.

Part III. The User-based Design Process and Its Application

As mentioned earlier, the project team developed and implemented a user-based design process. In the user-based design process, the user occupies a central place during the design process. The Web site is being designed for the user, and his input is solicited throughout the process. Whenever possible design decisions reflect the user's rather than the designer's viewpoint. In the early stages of developing sites on the Web, Web page/site designers relegated users to a secondary position because, as a group, users' experiences were limited and idiosyncratic. But, as the Web matures, a body of users is developing that uses the Web not only intensively but also extensively so their experience can be tapped at various times during the design process. They have a good sense of the site features that influence their use of a Web site and can participate effectively as partners in the design of Web sites to suit their particular information needs.

In the user-based design process followed in this project, user input is solicited at several stages:

- early in the project to determine the criteria users apply to the Web sites they use.

- after a preliminary design of the Web site to elicit feedback and comments or to evaluate certain aspects of the site.
- when the Web site is operational to elicit continuous (or continual) feedback and suggestions for additions and/or modifications to the site.

Figure 1 shows four stages in the user-based design process. The stages follow a chronological sequence and move from the bottom up to reinforce that each builds on th other. The key element that distinguishes this process is that users are consulted at each stage of the design process, not simply at the end, after design and content features have been largely determined by the design team.

As noted in Figure 1, for the user-based design process to work effectively, the design team should have a clear understanding of the usual task-related information seeking and use behavior of the client group. This background provides a context for understanding the users' specific comments about Web use. Ideally the designers should understand the kinds of information the users typically use, perhaps some specific sources, what form those sources are in (print, video, etc.; electronic, hardcopy), how the users locate them, and what problems they experience in looking for information they need. This picture should include not only use of formal, print sources, such as a journal, but also informal contacts with colleagues or others, such as businessmen or students. For a Web resource to be effective in responding to information needs, the designers should have a clear understanding of those needs and of the range of competing and complementary sources the users are accustomed to consulting.

This background information is placed before the stages in the design process in Figure 1 for several reasons. First, all of the decisions during the design process occur within this context; it should influence and enlighten the data-gathering, analysis, design, and implementation decisions. Second, in some cases, this information can be obtained from existing studies of user information-related behavior, so this part of the project actually occurs as part of an organized review of relevant research before contact with the user group. Unfortunately, use studies of the relevant user groups do not always exist. Another failing of these use studies even if they do exist is that their reliability and validity usually decreases with time since the information scene changes so rapidly. In this project, for example, useful studies existed, but they were done before widespread use of the Internet and, as a result, did not provide a good picture of electronic information use in the context of total information use. As a result, Stage 1's information gathering expanded to include getting information about total task-related information use behavior in addition to criteria-oriented information.

Information-Gathering Stage

Determining the criteria the client applies in judging the usefulness of a Web site is the major task at Stage 1. The data can be gathered through a variety of means, such as

questionnaires or interviews. As noted in Part II of this report, the most important data-gathering for this project occurred during the half-day focus group session with business school faculty. The data provided rich insights into how business faculty are using the World Wide Web and the criteria they use in judging sites.

The audience for the test site was the same as the one reflected by the focus group participants, business school faculty. Some suggestions for the content were drawn from the focus group results. This information was used in combination with the objectives and the design criteria to make a variety of decisions during site development.

Development Stage

Several critical tasks occur at this stage. Obviously the designers need to understand the criteria since they will serve as the underlying basis for the design. To do this they need to operationalize the criteria and assess their implications for design. In the process, they also rank the criteria based on feasibility. Then, the designers translate the criteria into Web site features and design a preliminary version of the Web site. Since the overall approach is to allow for continual user feedback, at this stage the designers consciously have to incorporate feedback mechanisms into the design.

Operational definitions were established for the criteria in this study on the basis of the comments made by the users. It is important that the criteria be operationalized from the perspective of the user and not the designer. These criteria can be used to generate a wealth of specific suggestions for site design as shown in the following paragraphs. Table VI contains the operational definitions for the criteria.

Content. Content was the highest rated of the criteria identified and, as is shown in Figure 2, is core to the design process. All other criteria impact the content of the site. Clearly, if the content requirements are not met, users in this group will not use a Web site. Emphasis here is on useful and current information. To understand what is useful, it is necessary to have an understanding of the information seeking behavior of the group. In addition to useful, an element of novelty is desired, that is, information that is not easily accessible elsewhere. This finding is extremely important for Web designers. Users will visit a site only if it offers them useful content. The importance of content is stressed by Tufte (1997) in his discussion of information design and computer interfaces.

The brainstorming session on content went beyond the development of this general content definition and provided specific examples of resources that permitted the development of categories of content that would be useful for the development of the Web site. For example, in mentioning financial data for companies, the focus group referred specifically to filings with the Securities and Exchange Commission or to Value Line analyses. Referring to business-related news, they mentioned *Wall Street Journal* and the Bloomberg News Service.

Table VI. Operational Definitions of User Criteria

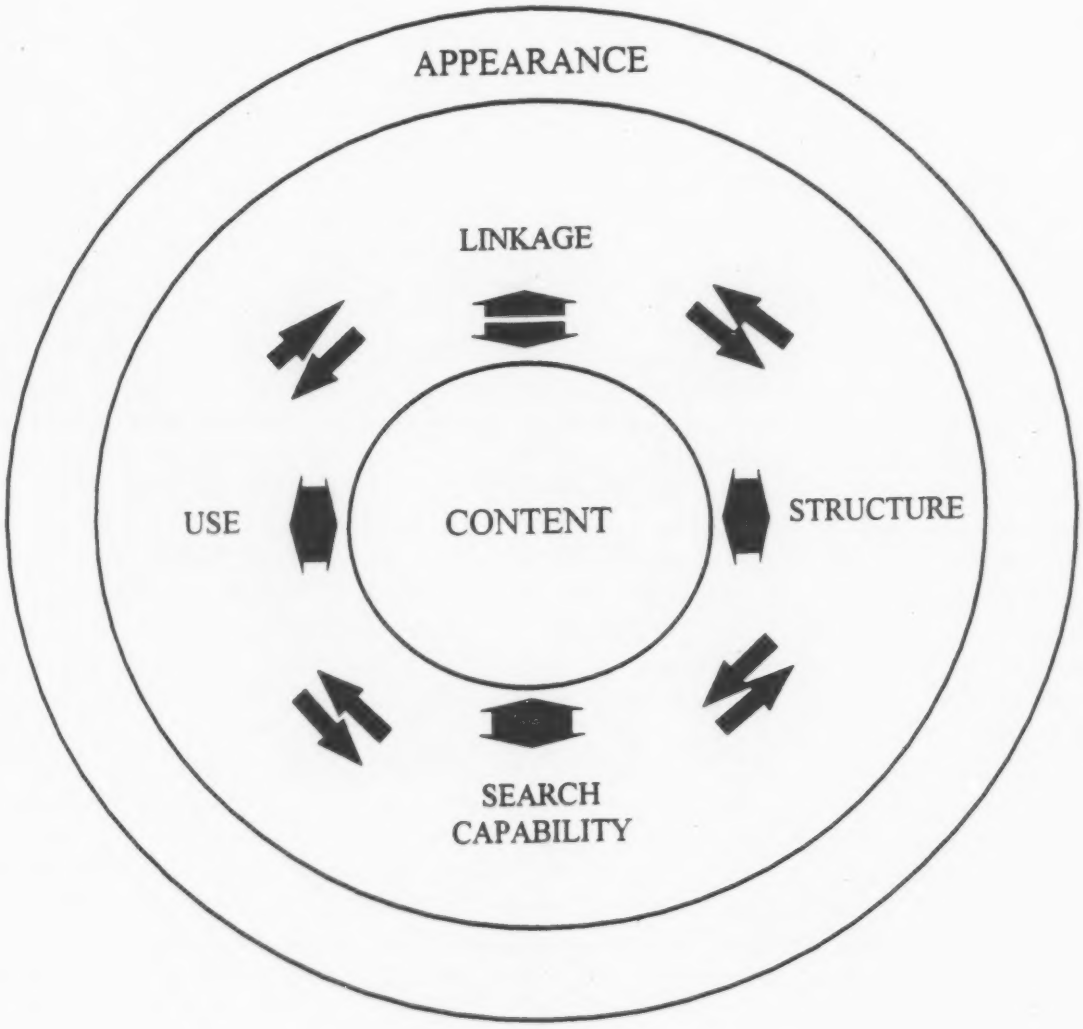
Use	The site is easy to use. An overview of the site and appropriate navigation structures are available. Users do not get lost easily.
Content	Useful information. Current information. Concise non-repetitive information. Information not easily or readily found in library collections. Absence of the following: superficial and repetitious information, uninformative content, advertisements, boring text, lack of currency.
Structure	The site displays an intelligible, straightforward organizing scheme. Text is broken into appropriate, well-labeled subsections. Large blocks of text are minimized.
Linkage	Pages provide links that integrate relevant information at the site and at other sites. Link provide access to related topics allowing serendipitous discovery of information. All links function; broken and under construction links are avoided.
Search	Search support for page and site searching are provided. Searching produces a precise list of helpful sites or pages with a minimum of processing time.
Appearance	The site is visually attractive on-screen. Any given page contains few graphics and these are appropriate to page content. Graphics are not essential to site use; if graphics are turned off or a text-only client is used, the site remains fully functional. Pages result in attractive printouts without large dark areas.

Note: The criteria are arranged in ranked order of importance.

The examples of specific sources mentioned above bring to light an interesting point relating to the importance of authoritative information to users. During the brainstorming session, the word "authority" did not surface. Yet, the importance of authoritative information was obvious in the sources cited by the users. It seems that authority is intertwined with content and is implicit. That is, when a user states that information must be useful, they are referring not only to topic coverage but also to the source or producer of the information. So, the users most often provided qualified examples of content. Rather than indicate a need for a general type of information, such as case studies, the users specified specific authoritative sources for this type of information, such as the Harvard Business School. Implicit qualifying by authority extended across all types of information.

The users' discussion of desired content largely structured content development of the test site. All of the main resource categories visible on the home page (Figure 3) were discussed in one form or another as providing useful content to focus group members. The featured site category was directly suggested by users' discussion of the value of discovery of novel information resources. Initially the information sources provided are constrained to content provided by existing sites with value added largely by annotation,

Figure 2. User-based Criteria and Their Relationships



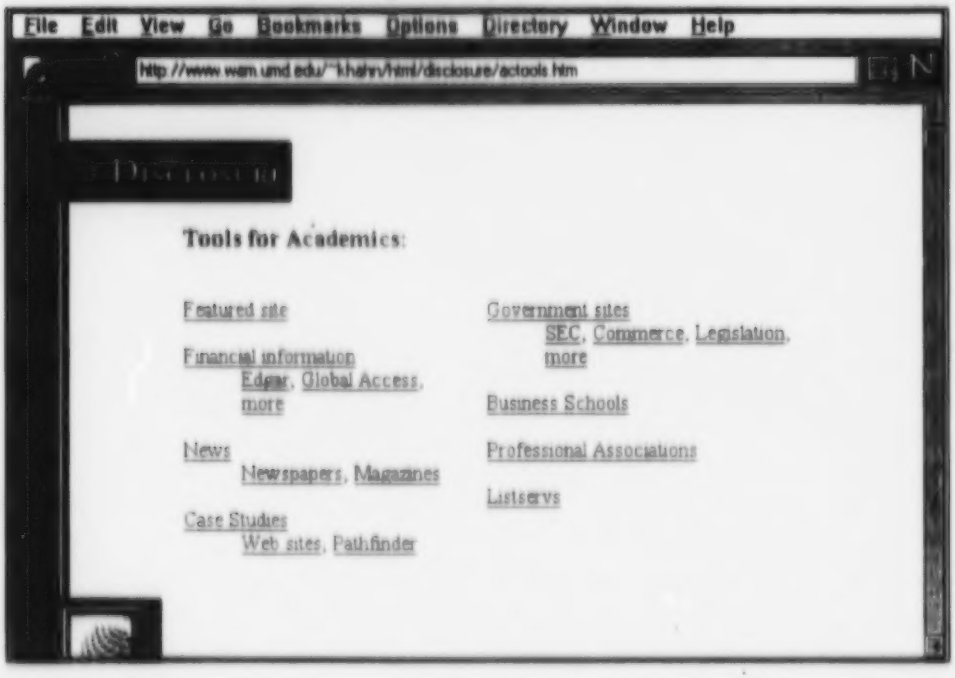
Note: Because this is a uni-dimensional display, not all relationships are evident.

organization, and linkage. However, mechanism are incorporated into the test site for users to suggest needed content. Currency of update is indicated on all site pages and a regular schedule of link checking is followed.

Structure. The structure criterion suggests that arrangement of site content should not be incidental or arbitrary. Users expect not just a clear structure, but one which makes sense. The home page or major navigation pages should indicate the structure of the site's content. When categories organize the site structure, it should be easy for users to distinguish between categories. Users prefer content to be broken into small chunks. This suggests that multiple short pages are easier to manipulate and comprehend than long pages requiring scrolling. Chunks of text could be organized in a variety of ways including linear structures, hierarchies, or networks. The concern for intelligibility indicates that labeling must be sensible, consistent, unambiguous, and jargon-free.

In the design of the test site, seven categories were created at the top level and are displayed on the home page (See Figure 3). The categories were drawn from users suggestions and to the extent possible borrowed their terminology. The categories are distinct from one another and are set off from supporting elements such as logos, revision dates, and access to evaluation forms. Content is organized at subsidiary levels in the hierarchy as well. For instance, academic business listserv lists are grouped by subject. Publications are organized by format.

Figure 3. Original Top Level Page



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Linkage. Although linkage relates to structure and organization, it emphasizes the need for integration of information between and within sites. Links should pull together related information to allow the users to explore and discover information serendipitously. Linkages are the results of intellectual effort by site designers to identify and provide connections to related information available at other sites and thus to add to the perceived value of the original site. The inclusion of links that are "under construction", incorrectly coded, or outdated can quickly convince users that a site is a waste of their time and resources. Notices of most recent update or verification provide users with some assurance that links are reasonably current.

At the test site, links integrate information within the site and bring together information from across the Web. Internal links provide access to information justifying decisions about the inclusion of content. They also provide access to opportunities to evaluate the site or suggest content. External links are the main value added by the service. A variety of business sources are brought together and integrated by content, format, and publisher.

Use. Clearly, structure is related to ease of use. The content indicators and organizing structures should be integrated into the navigational system. Links and buttons facilitate navigation in a Web environment. Overviews make a site easier to understand and easier to use. While many think of home pages as providing the main site overview, intermediate overviews at alternate levels can also be helpful. If site structure is even crudely hierarchical, top-down navigation is easily facilitated by making subsection names into links connecting an overview to the subsections. Bottom-up navigation is not as easily facilitated by simple links, but many sites use button bars effectively to provide a summary of the site organization and link subsections to each other and to overviews. Small page size can also facilitate rapid navigation by reducing the need for scrolling.

The test site uses links and buttons to support top-down navigation. Tables are used to facilitate page organization and minimize white space and consequently the need for scrolling. The organizing structure links directly to subsections. Shortcuts to popular subsections are provided by listing two hierarchical levels for many of the main organizing categories. For instance, "News" is linked to a subsection organizing newspapers and magazines, but links directly to "Newspapers" and "Magazines" are also available directly from the home page.

Search. Search capabilities should perhaps be an obvious part of site design, but implementation is rare since the development of a separate search module is required for site searching. Sadly, non-functional search features or search features that function quite poorly are common among Web sites. Users want responsive, effective searching, and this area presents the greatest challenge to current designers, particularly those with

limited resources. Currently the test site does not support a site search capability. This functionality is high on the priority list for future enhancements on the test site.

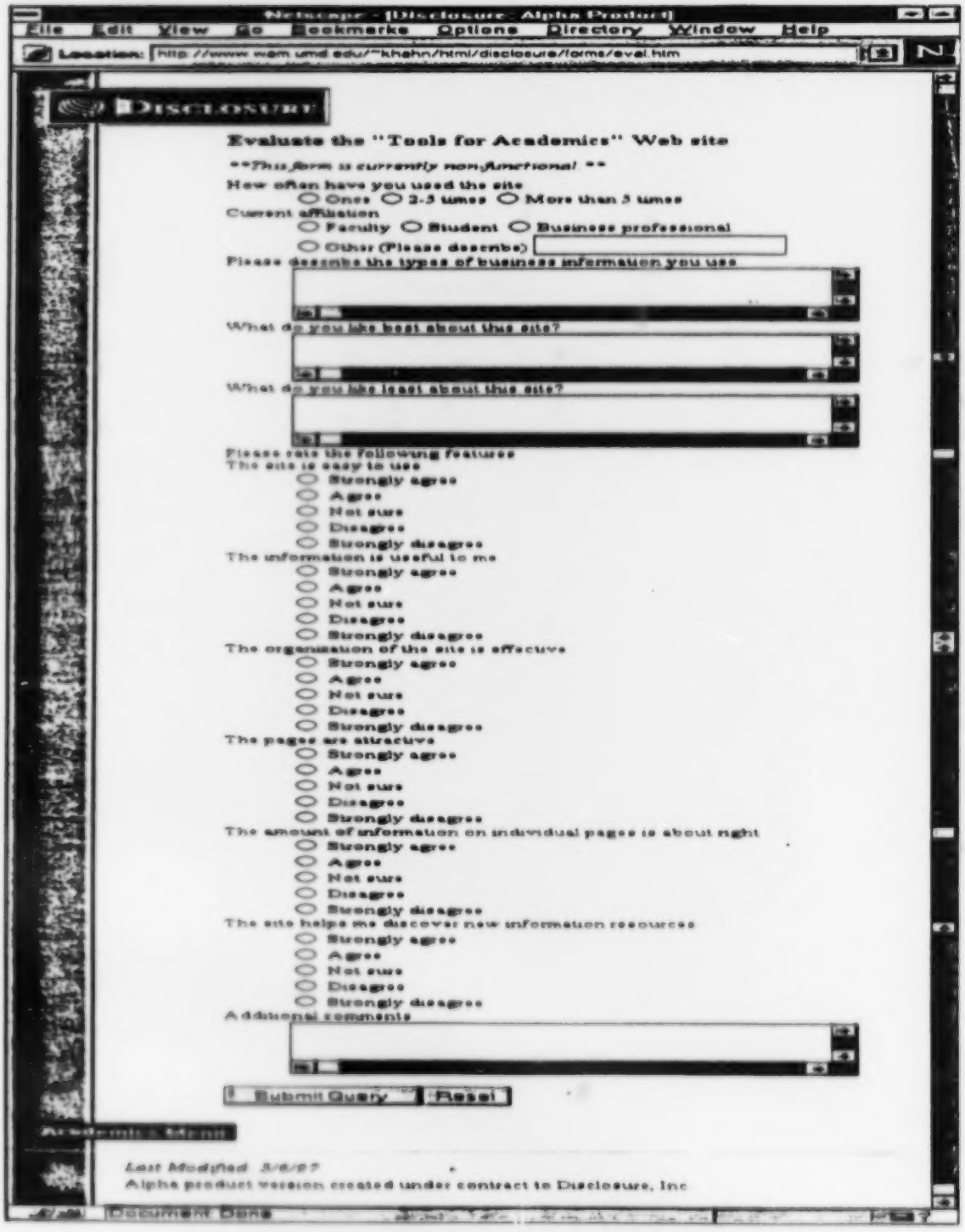
Appearance. Although users are clearly aware of site appearance, it is apparent that they regard it as cosmetic and mentioned many hindrances to use created in the search for an attractive site appearance. Unattractive graphics, excessively numerous graphics, over-large graphics, dark graphics, and graphics that are required for effective site use are all deplorable. Although advice to system designers almost unanimously discourages spurious use of graphic elements, clearly many sites are not implementing this advice, perhaps because the degree of offense to users can be easily overcome by other site virtues.

In the test site, tables create an attractive layout of page elements and impose a uniformity of appearance on pages. A few small graphics enhance consistency of appearance between pages; these double as buttons to provide navigational support. A white background was used to improve readability. Other than this background alteration, basic defaults for text appearance were not altered.

With the exception of search functionality, all of the user-generated criteria for use provided significant guidance for the initial test site design. The criteria were easily operationalized with the operational definitions suggesting both what should be available in terms of content and how the content should be presented to users. The implications ranged from relatively superficial issues about appearance and terminology to more profound issues such as site structure, category definition, and selection policies. Ultimately, the test site content was organized into eight major sections, each suggested by comments from focus group participants. Content emphasizes resource discovery and ranges among directory type information, links to resources external to the site, and instructions and tutorials.

The organization of the site is indicated on the home page and reflects terminology natural groupings used by business faculty. The site functions largely as a resource to provide access via linkage to a wide range of Web-based information. As the criteria structured content and design decisions, they also provided a structure for initial design of feedback mechanisms. The criteria categories are evident in the preliminary design of the site's evaluation form (Figure 4). This form is not simply an open request for feedback but demonstrates a serious interest in user's thoughts and provides a framework to encourage users to provide information at a level of detail and consistency that allows site designers to use feedback as a basis for informed decision making. The evaluation form is an integral part of the site design rather than a temporary adjunct and is expected to provide ongoing feedback for site development. In addition to the overall evaluation form, forms are also available on most pages encouraging users to suggest resources for addition to the site's content.

Figure 4. Evaluation Form



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In some instances, the evaluation stage may also include testing. Usability testing may be appropriate in those cases where specific design features are used to accomplish particular tasks. For instance, classic usability testing might be applied to determine the effectiveness of a site's search function, to test a site's effectiveness for resource discovery, or to evaluate some special functionality of the site.

Evaluation Stage

Evaluation of the Web site is a stage in and of itself in the user-based design process when the site is in its initial development, and it is also included as a part of the implementation stage on a continual basis. Before the test site becomes operational, it is imperative to have users evaluate the site in order to determine if the criteria were translated appropriately into design. It is important to obtain feedback on the design criteria. This can be accomplished through questionnaires administered to the user group who are asked to use the site and respond to specific questions. Another option is to use the talk aloud protocol to illicit comments from users with a researcher present. Both methodologies result in data useful for modifying the Web site. This process is iterative so that evaluative comments are solicited from the user group after changes are made based on previous suggestions. The process continues until reactions received from the users indicate that the site is ready for implementation. In some instances, the evaluation stage may also include testing. Usability testing may be appropriate in those cases where specific design features are used to accomplish specific tasks. For instance, refining the design of a Web-based currency exchange calculator or yellow page directory are tasks that can be enhanced by usability testing. In contrast, browsing and information exploration are quite open-ended and unspecified.

Two groups evaluated the site: the focus group members, and a larger selected group of academic users contacted by representatives of the funding agency. Focus groups members were sent an evaluation form via electronic mail. The e-mail evaluation form is included in Appendix E. The latter group were contacted informally by firm representatives and reported back to the development team verbally. Including the latter group in effect tests the generalizability of the criteria and design to a broader community. The feedback received from the two groups is being analyzed and considered within two external constraints. First, the comments must fit within the objectives of the site, and second, they must be feasible to implement. Feasibility is based on economic and technical considerations. Any suggestions which are not incorporated into the Web site at this time will be saved and reviewed periodically to determine if they can be incorporated or are no longer useful at a later date.

Evaluation is iterative at this stage. If the modifications to the Web site based on their comments are substantial, the two groups will once again be asked to react to the suggestions. And the process will continue until an acceptable version of the Web site is

ready. The final version of the Web site is described in the implementation section of this technical report.

Implementation Stage

At some point in the user-based design process, the site is considered complete and finished. The final version of the Web site represents not only the design as based on the user group's initial criteria but also their feedback and possible feedback from other members of the same community to preliminary versions of the site. No Web site developed through this user-based design process is ever considered "finished," since user feedback and suggestions occur continually. This continual feedback should continue to be considered in making decisions about site design. But design is no longer the major focus of the site developers; implementation and maintenance become paramount.

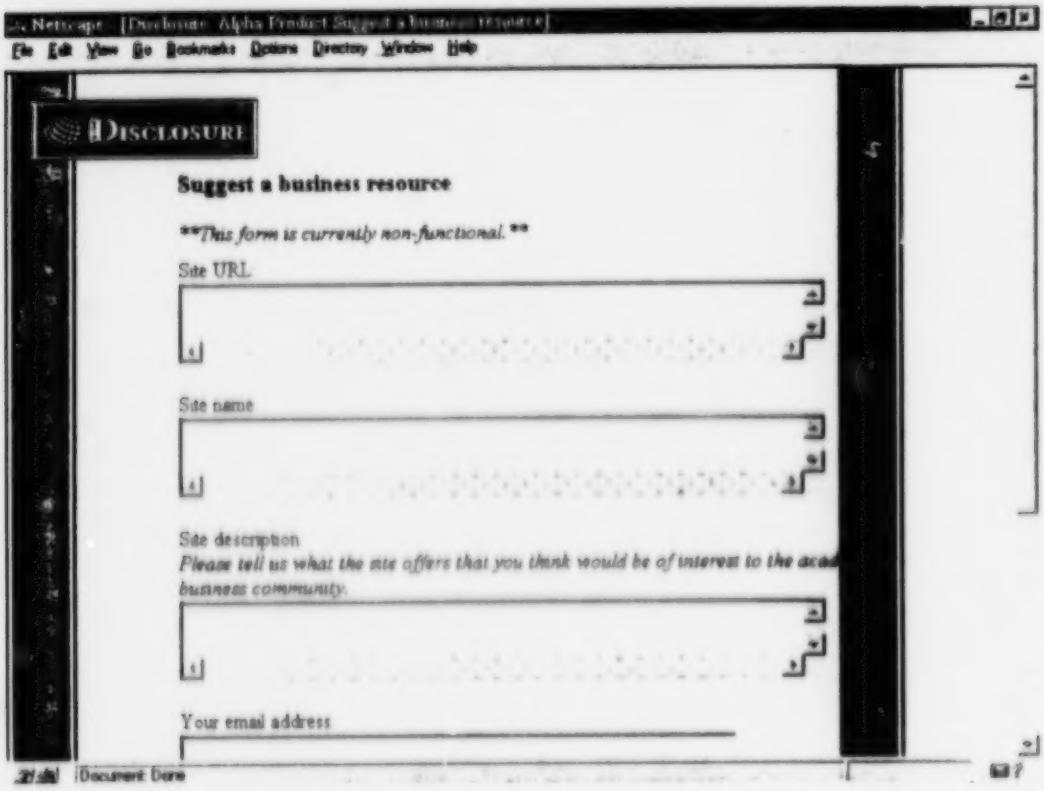
In the implementation stage, the site becomes operational and available. Real users begin to incorporate the site into their normal information-gathering behavior. At this point, site developers may find it useful to announce the Web site's availability formally to members of the primary user groups, using both electronic and non-electronic means. Otherwise, the site's use is likely to occur through references from Websearch services and word-of-mouth.

The formal feedback mechanisms incorporated into the Web site at Stage 2 are activated. Usually these are likely to consist of evaluation and/or suggestion forms. The evaluation form developed for this site asks users to comment on the site on the basis of the design criteria: ease of use; usefulness of information; organization of site; attractiveness of pages; amount of information on pages; and usefulness in discovering new information. Users are also asked to identify what it is that they like best or least. The evaluation form is included in Figure 4. In addition to evaluating the site, users are asked to suggest new business resources to add to the site. The suggestion form is included in Figure 5.

Site developers continue to monitor the feedback and periodically assess the comments and suggestions. In addition, they note the use of specific segments of the site as indicated through the log. At this stage, a program should be established for continued development, which incorporates periodic emphases on design modifications in response to actual use, user feedback, and other changes in the information environment, such as the availability of new information. It is important to realize that user needs may shift over time and thus necessitate modifying the Web site.

Aside from the information gathered during the research phase of this project, several other factors influenced development of the Web site. These are comparable to any considerations a design team may establish with the agency funding the site's

Figure 5. Suggestion Form


File Edit View Go Bookmarks Options Directory Window Help
DISCLOSURE
Suggest a business resource
This form is currently non-functional.
Site URL
Site name
Site description
Please tell us what the site offers that you think would be of interest to the
business community.
Your email address
Document Done

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development. Various meetings were held between the project team and Disclosure staff. In those meetings, selection criteria and development guidelines were established. The Web site was transferred to Disclosure in early December 1997, and the integration process began at that time. A complete chronology of the project is found in Appendix F.

The actual development of the site followed in large part the criteria developed during the research phase with a few minor modifications. For the site, preference was given to the provision of free information. Preference was also given to electronic resources, but pointers to print information or to fee-based print or electronic information were included if an identified content need could not be met with free electronic sources. Both the organization and researchers agreed that the site would not be a self-serving commercial site designed primarily to promote the services provided by the funding agency. The only constraint placed on the development by the funding agency related to the financial section of the Web site. The development of this section was left primarily to the funding agency. The organization is committed to providing and maintaining a Web site with a broader objective of linking the academic business community to useful electronic and print resources.

Both parties agreed to develop a site that would allow for supporting the development of new Web-based information resources. In the long run, some new resources may be developed by this firm and others. They may be free or fee-based. This mix of free/fee-based services already exists for electronic business information. In this early period, both researchers and funding organization agreed to emphasize initially the free resources, based on knowledge of existing patterns of use of electronic information by academic users generally.

Content areas were added to the site during its development based on suggestions made by the development team and requests from the funding agency. The user group was broadened to include the general academic business community: students, faculty, and business librarians. Ideally, members of these other segments of the community should also have been surveyed to identify the content and design factors they consider appropriate. This was not done because of time and funding constraints. But the content was expanded, and the entire site was re-organized slightly to accommodate the new content. Table VII shows the relationship between the new categories in the final design and those used in the original design The final top level page is shown in Figure 6.

Part IV. Conclusion

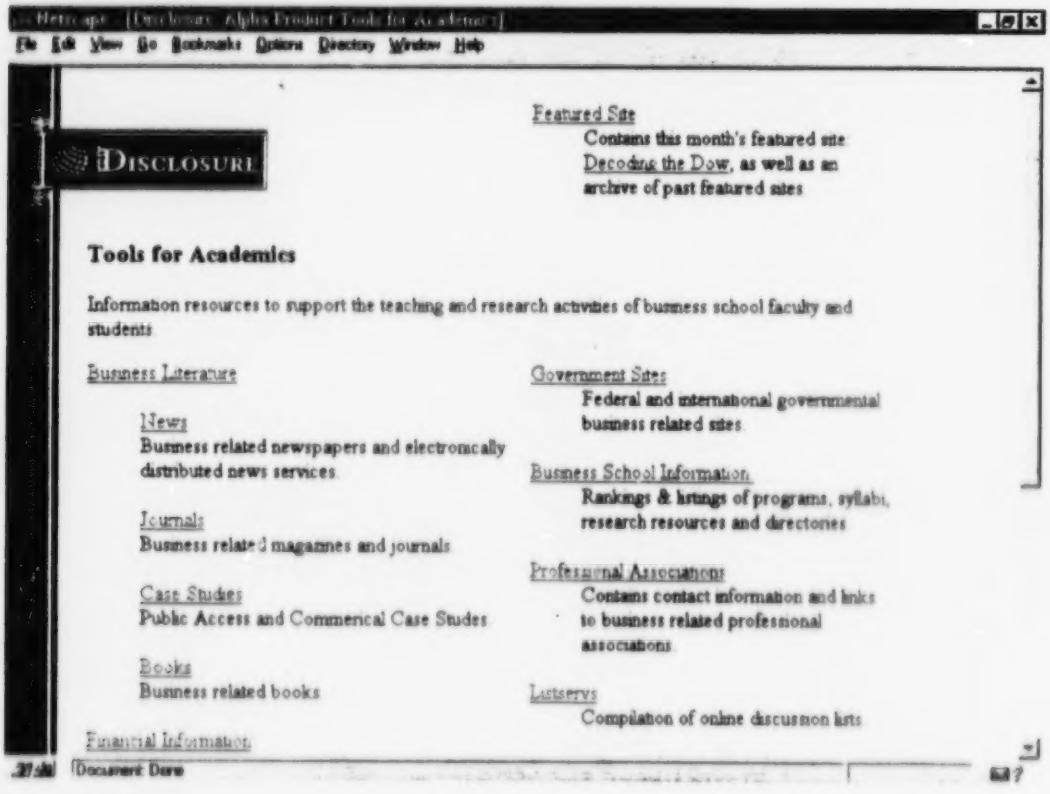
In existing design approaches, user input, where it occurs, is usually relegated to usability testing of specific design features. Methodologies have not been developed for utilizing user criteria as the basis for Web site design. This project takes the position that user input can and should be incorporated at an earlier stage in the design process. There

Table VII. Relationship Between Final and Original Categories

Final Category	Original Category
Business Literature: New broad category with following four subcategories	None
News: Subcategory with links to free and fee-based news services and business-related newspapers.	News: Major category containing newspapers and magazines.
Journals: Subcategory with links to free and fee-based business magazines and journals.	Magazines: Subcategory under News. Enhanced magazines to include journals.
Case Studies: Subcategory with links to free and fee-based case studies available electronically or in print.	Case Studies: Included print and electronic case studies.
Books: Subcategory with links to business-related books and book reviews.	None
* Financial Information: Broad category which includes stock quotes, annual reports, corporate financial and international market information.	Same
Government Sites: Broad category with links to federal and international governmental business-related sites.	Same
Business School Information: Broad category which includes rankings and listings of programs, syllabi, research resources (libraries) and directories.	Business Schools: Single focused major category became a subcategory within a broader category.
Professional Associations: Broad category which contains contact information and links to business-related professional associations.	Same
Jobs: New broad category with links to sites oriented to business school students.	None
Tutorials and Guides: New broad category oriented to students.	None

* Not completed by development team.

Figure 6. Final Top Level Page


File Edit View Go Bookmarks Options Directory Window Help
DISCLOSURE
Featured Site
Contains this month's featured site Decoding the Dow, as well as an archive of past featured sites
Tools for Academics
Information resources to support the teaching and research activities of business school faculty and students
Business Literature
News
Business related newspapers and electronically distributed news services
Journals
Business related magazines and journals
Case Studies
Public Access and Commercial Case Studies
Books
Business related books
Financial Information
Government Sites
Federal and international governmental business related sites
Business School Information
Rankings & listings of programs, syllabi, research resources and directories
Professional Associations
Contains contact information and links to business related professional associations
Listservs
Compilation of online discussion lists
Document Done

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is a growing body of experienced Webusers that can articulate to Web site designers what they like and dislike about current Web sites and what affects their usage patterns.

The results of the focus group session indicates that focus group sessions of relatively homogeneous groups of users yield useful data for the design and development of Web sites. The categories of criteria identified in the focus group session need further testing in larger samples within the same user group community as well as with other groups of users to test their generalizability.

The user-based design criteria development process developed and used in this research gathers input from users with a significant degree of Webuse experience. As Webusers have expanded not only in numbers but also in diversity of interests and information needs, the Webhas also become in total more universal in its resources and information providers. What distinguishes this period of its growth is an increasing clamor for filtering, organizing, and designing the resources so that a better match is made between the appropriate resources and the user communities for whom they are intended. Among the many users of the Webare increasingly knowledgeable and experienced user communities that can discern useful information and Web site features that impact their continued use of Web sites.

Users are brought together to discuss their information use in general and criteria that influence their use of the Web. To elicit the widest possible range of responses, users identify both positive and negative criteria. Users also indicate the relative importance of the criteria they identify. The data gathered are not simply translated into specific criteria but are analyzed and synthesized to generate broad design principles. Interpretation of the criteria is grounded in a broader discussion of general information use and overall Webuse. The over-riding and guiding principle behind the design is the importance of content to the user. Without content, users will not return to a site.

The multi-stage, user-based process of developing a Web site used for this project is entirely appropriate for designing Web sites at this period of the Web's development. It probably could not have been implemented as effectively at an earlier period, except for certain groups who were long-term users of the Web, because it depends so heavily on the existence of a knowledgeable, experienced user group. The user and his or her information needs and criteria for judging Web sites are paramount in the process; the designer's role is to translate these into an effective Web site.

Another important feature of this process is that evaluation and feedback are incorporated into the implementation phase so that the users continually have the ability to suggest new resources, to react to organization or links, or to make comments about the appearance of the Web. The extent to which the user group will make use of these feedback mechanisms is still unknown but, if the mechanisms work, the site designers essentially have continual feedback to facilitate maintaining the site and making design

modifications as necessary or useful. In this project, for example, the users emphasized they wanted their information to be current and that they disliked sites that contained links to nowhere. It seems highly likely that, faced with links to non-existing sources or dated information, they will react if it is easy for them to react and if they perceive that the site designers act on their feedback.

Although the data about use had immediate implications in this project for the design of a particular site, the process and results raise several intriguing questions. To what extent are the criteria that were identified in Stage 1 universal criteria? If they are, do all user groups rank them in the order identified in this project, with content and structure being more important than appearance? What characterizes information that clients are willing to pay for as opposed to that which they think should be freely available? Are sites designed with the user-based process different from those designed without user input? Are they more effective?

The user-based design process should be readily transferable to other groups and other Web sites, and it has been described in sufficient detail in this paper to allow for use by other Web site designers. Only through additional use by other Web site designers in other situations can the transferability really be tested.

Notes

1. For positive features, the scale is 1 to 5 with 1 as "no influence at all" and 5 as "highly influential;" for negative features, the scale is 1 to 5 with 1 as "no negative influence at all" and 5 as "most negative influence." In both cases, a "5" represents the high extreme of a participant's judgment.

2. Some of this information is already on the Web, *e.g.* Web sites for corporations, which include information often contained in printed annual reports.

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Appendix A. University of Maryland Human Subjects Research Approval

UNIVERSITY OF MARYLAND
College Park, MD 20742

INSTITUTIONAL REVIEW BOARD
APPLICATION FOR REVIEW OF RESEARCH USING HUMAN SUBJECTS

Name of Principal Investigator (or Faculty Advisor) Eileen G. Abels Tel.No. X52043
Name of Student Investigator _____ Tel.No. _____
Student Identification No. _____

Department ~~CLIS~~ Project Duration 9 months

Project Title ~~User based criteria for the development of world wide web sites for the academic business community~~

Funding Agency _____
C.J. Disclosure Inc.

Has this project been approved by a department Human Subject Review Committee?
Yes 1/13/97 (date) No _____

Please attach a copy of your responses to questions I - IV of the instructions along with the proposal.

Please specify whether this research should be exempt or non-exempt for human subjects review and stipulate which of the five exemptions reasons (attached) justifies an exempt status:

Exempt X Non-Exempt _____

If exempt, indicate reason for exemption (see page 3 for exemption reasons)

~~This research is exempt because the software being used in the focus group session will not link the respondent to the criteria. Furthermore, the subject of the focus group is the world wide web and the subjects will not be~~ at any risk. (Reason number 3)

January 3, 1997
Date

Eileen G. Abels
Principal Investigator (or Faculty Advisor)

_____
Date

_____
Student Investigator

Natalie Taylor
Department Chair's Signature or Departmental Human Subjects Review Committee Chair's Signature

BEST COPY AVAILABLE

I. The College of Library and Information Services proposes to perform research on user needs and to design a working prototype Web site for Disclosure's academic business community. A focus group session will be held with business school faculty from the Washington and Baltimore areas to determine criteria for the development of Web pages.

II. Twenty faculty members have been invited from business schools at UMCP, Georgetown University, George Washington University and University of Baltimore. We tried to get a mix of assistant, associate, and senior faculty members primarily in the areas of finance and accounting and including both male and female faculty members. Some of the selected faculty members have home pages and all must have electronic mail accounts. Invitations have been sent via e-mail.

III. The subjects will participate in an electronic brainstorming session held in the AT&T teaching theater. They will be asked questions relating to what they look for in web pages and their use in general of information sources.

IV. There are no risks to the subjects.

V. The BrainQuest software being used in the session permits participation anonymously so the criteria developed will not be linked to any one individual. Furthermore, any reporting of the results of this study will not identify the participants.

VI. Participants have been told the exact intent of the session. A copy of the invitation is attached.

Appendix B. Invitation to Participate

As part of a research effort to identify criteria for the development of World Wide Web sites to serve the academic business community, we are convening a half-day focus session of selected business school faculty from the Washington and Baltimore areas. We would like to invite you to participate. The session will be held on Friday, January 31, from 9:00 a.m. to 12:00 p.m. with lunch afterwards, and you will receive an honorarium of $100 for your participation. The session will be held in the AT& T Electronic Teaching Theater at the University of Maryland College Park, using the BrainQuest software. This research is funded by Disclosure, Inc.

The following is the schedule for the day:

9:00 a.m. - 9:30 a.m.	Registration and Coffee
9:30 a.m. - 10:45 a.m.	Focus Group Brainstorming
10:45 a.m. - 11:00 a.m.	Break
11:00 a.m. - 12:00 p.m.	Setting Priorities
12:15 p.m. - 1:30 p.m.	Lunch at the Rossborough Inn

The focus group session should be mutually beneficial. We are certain that you will provide us with valuable input for our project. In return, you will have a chance to network with faculty from other business schools in the area, plus receive the honorarium.

Please let us know if you will be able to participate in this session by sending e-mail to ea29@umail.umd.edu no later than Thursday January 9, 1997. If you are unable to attend but know of another business school faculty member who may be interested, we would appreciate your suggestions. If you will be attending the session, we will mail a map and parking permit to you. We will be sending a very brief questionnaire via e-mail prior to the session to obtain needed demographic data.

We look forward to hearing from you.

Sincerely,

Eileen G. Abels, Assistant Professor
Marilyn Domas White, Associate Professor
College of Library and Information Services
University of Maryland, College Park

Appendix C. E-mail Questionnaire

Dear [NAME]:

Thank you for agreeing to participate in the Business Faculty Information Needs focus group session. I would appreciate it if you would complete the brief questionnaire that follows and return it via electronic mail. We will be using the information to structure our discussion questions and to avoid using time During the group session for gathering basic background information. Please make sure that you continue to the end of the questionnaire in your response.

Indicate the frequency that most accurately describes your electronic mail usage under normal circumstances: (Place an X next to the most appropriate answer.)

___ Daily
___ Several times a week
___ Several times a month
___ Almost never

Please estimate the month and year in which you first began to use electronic mail:

_____ Month _____ Year

Do you use the World Wide Web:

___ No ___ Yes

If yes, indicate the frequency that most accurately describes your Web usage under normal circumstances:

___ Daily
___ Several times a week
___ Several times a month
___ Almost never

Please estimate the month and year in which you first began to use the World Wide Web:

_____ Month
_____ Year

Please indicate any of the following categories which describe functions for which you have used the World Wide Web:

___ Research
___ Teaching
___ Consulting
___ Administration
___ Editorial work
___ Other - Please describe:

Please indicate all the levels of students that you instruct:

___ Undergraduate
___ Masters
___ Ph.D.

Do you encourage your students to use the World Wide Web:

___ Yes
___ No

Are there electronic forms of business information that you purchase or pay a fee for currently?

___ No
___ Yes Please list:

Are you familiar with the Disclosure company:

___ No
___ Yes Please explain: _____

Appendix D. Description of the VisionQuest Software

The VisionQuest software product was originally produced by Intellect Corporation. Unfortunately, it is no longer supported or available for purchase. The Windows version of the software was used for the focus group session. Descriptions of this software are also available in published reviews (Keizer, 1995; Kranz, 1994) and a Web site (http://www.inform.umd.edu:8080/TT/Specs/Software/VQ.html).

VisionQuest is designed to facilitate group interaction by providing functionalities for such group processes as idea generation, grouping, and evaluation. Brainwriting supports a brainstorming style of idea generating. Participants simultaneously contribute items anonymously and send them to the facilitator's station where they are collected and made available to the entire group. Group members can thus monitor others' suggestions while compiling their own contributions. Comments can be added to individual items by the use of comment cards which again offer individual anonymity combined with group display. Grouping of categories is facilitated by the use of compactor functionality. The compactor lets participants move items into categories. These may be pre-specified. VisionQuest provides a range of options for evaluating items once they have been generated. Group members can define the relative significance of items(the categorize function) , assign scores which can subsequently be normalized, vote, rate items with the scale being determined by the facilitator, or rank items by dragging them up or down a lists. Evaluation is performed individually and then the results are anonymously submitted to the facilitator's station where the software compiles the results and returns the results to the group.

During the focus group session, the brainwriting capability was used to generate responses to questions regarding participants' information use and generate criteria indicative of good or poor design. The results from these open-ended questions were then evaluated using the rating functions and in some cases categorized by anticipated usefulness. Rating was done using five point scales oriented so that low ratings corresponded to least impact and high ratings corresponded to highest impact.

Appendix E. E-Mail Evaluation of the Focus Group Session

Dear [NAME] :

Thank you again for participating in the focus group. We would appreciate it if you would take a few moments to fill out this evaluation form. Please indicate your assessment of the following areas using the 1-5 scale where one indicates complete disagreement and 5 indicates complete agreement. If you prefer, you could print out the evaluation and mail it back to me.

Evaluation of Business Information Needs Focus Group Session

A. I understand the purpose of the focus group session.
____ 1 Disagree completely
____ 2
____ 3
____ 4
____ 5 Agree completely

B. The session was well organized.
____ 1 Disagree completely
____ 2
____ 3
____ 4
____ 5 Agree completely

C. The questions discussed fit the goals of the session.
____ 1 Disagree completely
____ 2
____ 3
____ 4
____ 5 Agree completely

D. Using the Vision Quest software made it easy for me to express my ideas and opinions.
____ 1 Disagree completely
____ 2
____ 3
____ 4
____ 5 Agree completely

E. The session allowed me to express my real thoughts and opinions.
____ 1 Disagree completely
____ 2
____ 3
____ 4
____ 5 Agree completely

F. The structure of the session facilitated the emergence of the widest possible range of thoughts and opinions.

____ 1 Disagree completely
____ 2
____ 3
____ 4
____ 5 Agree completely

G. I benefited from participating in the session.

____ 1 Disagree completely
____ 2
____ 3
____ 4
____ 5 Agree completely

H. I would be willing to participate in a future focus group of this type.

____ 1 Disagree completely
____ 2
____ 3
____ 4
____ 5 Agree completely

I. Are there any other thoughts you would like to share about the focus group session?

Appendix F. Chronology of the Project

Date	Project Team Activities	Events
December 1996	Selection of participating business schools. Decision to schedule focus group in January, 1997.	Project funding approved by Disclosure, Inc.
January 1997	Selection of initial participants. Invitation developed. Questionnaire developed Focus group session questions developed. Facilities arrangements made. Participant biographies developed. Questionnaire responses compiled and analyzed.	Invitation issued to selected business school faculty. 1/9 Initial deadline for response. 1/22 Extended deadline for response. 1/24 Questionnaire e-mailed to participants. 1/31 Focus group met.
February 1997	Focus group data analyzed. Evaluation questionnaire developed and sent. Questionnaire responses compiled and analyzed. Preliminary design of Web site. Wrote article reporting on needs assessment.	2/19 Evaluation e-mailed to paricipants.
March 1997	Initial development of Web site continued.	
April 1997	Web site development continued. Formative evaluation. Wrote article reporting on user-based Web site design process.	4/8 Met with Disclosure staff to present initial design. 4/15 Focus group members asked to evaluate initial design.
May 1997	Second stage of development of Web site.	
June 1997	Did various iterations of design and expanded content.	6/26 Met with Disclosure staff for feedback from sales staff.
October 1997	Began final development stage and prepared for transition of site to Disclosure.	10/9 Met with Disclosure staff to present development and agree upon final format and criteria.
November 1997	Finalized design. Checked for active sites.	Finalized process for transfer. First article published in *Internet Research*.

Date	Project Team Activities	Events
December 1997	Sent zipped files to Disclosure. Wrote technical report.	Disclosure begins process of incorporating site for academics into their existing site.